**Parallax Investigation**

**Aim:** To verify the parallax method of working out distances of objects.

**Theory:**

A parallax is a method used to measure the distance of objects. Astronomer uses this to work out the distance of stars using the earth’s orbit around the sun.

For our purposes we will do a simpler 90 degree parallax. All we need to do is create a right angle triangle from our first measuring point to the object. The following is a birds-eye view of the setup.

**Material:**

* Protractor
* Pen and Calculators
* Measuring Tape

**Method:**

1. Pick an object to investigate, not too far yet. This is your **“object description”.** Record into your results table.
2. Have a person stand a first measuring point.
3. Lay the tape measure to the person’s right and let the person stand at the starting end of the tap measure.
4. Have that person face the object holding a protractor.
5. Make a 90 degree angle with the object and the tape measure using the protractor. The person may extend their arms out to show the direction.
6. Extend the tape measure to 3metres. This is the **gap distance**. Record it!

3m

1. Have a second person stand on the other end of the tape measure 3m away for the first and measure the angle to the object with a protractor. This is your **angle θ.** Record into your results table

3m

1. Calculate the distance of your object. This is your “**calculated object distance**”. Record into your results table.
2. From your first measuring point, measure the distance from that point to the object. This is the “**actual object distance**”. Record into your results table.

3m

1. Repeat this procedure for farther objects. (If the object is too far you would not be able to measure the actual distance of the object).
2. Try a difference gap size if time permits.

**Results:**

**RECORD TABLE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Object Description | Gap Distance (m) | Angle **θ** (degrees) | Calculate Object Distance (m) | Measure Actual Object Distance (m) |
|  | 3 |  |  |  |
|  |  |  |  |  |
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**Discussion Questions**

1. Draw a diagram of your measurements in your book and calculate the distances from the object using trigonometry.
2. Comparing the calculated object distance and the actual object distance how similar were the results?
3. If the results were way off, what are some of the things that would contribute to this error?

**Extension Task**

Feeling confidence about being able to calculate the distance of objects? How about the height of objects??

Here is how it can be done.

You can work out the height if you had.

-The distance from the object (using a parallax)

-Your shoulder height

-The angle your arms makes to the top of the object.

What trigonometric ratio would you use and how would you calculate the height?

**Results Table (for extension task)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Object Name (m) | Gap Distance (m) | Horizontal Angle (degrees) | Calculated Object Distance (m) | Measure Object Distance (if possible) (m) | Vertical  Angle (degrees) | Calculated Height (m) | Measured Height (if possible) (m) |
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